Impressão 3D na Ortopedia

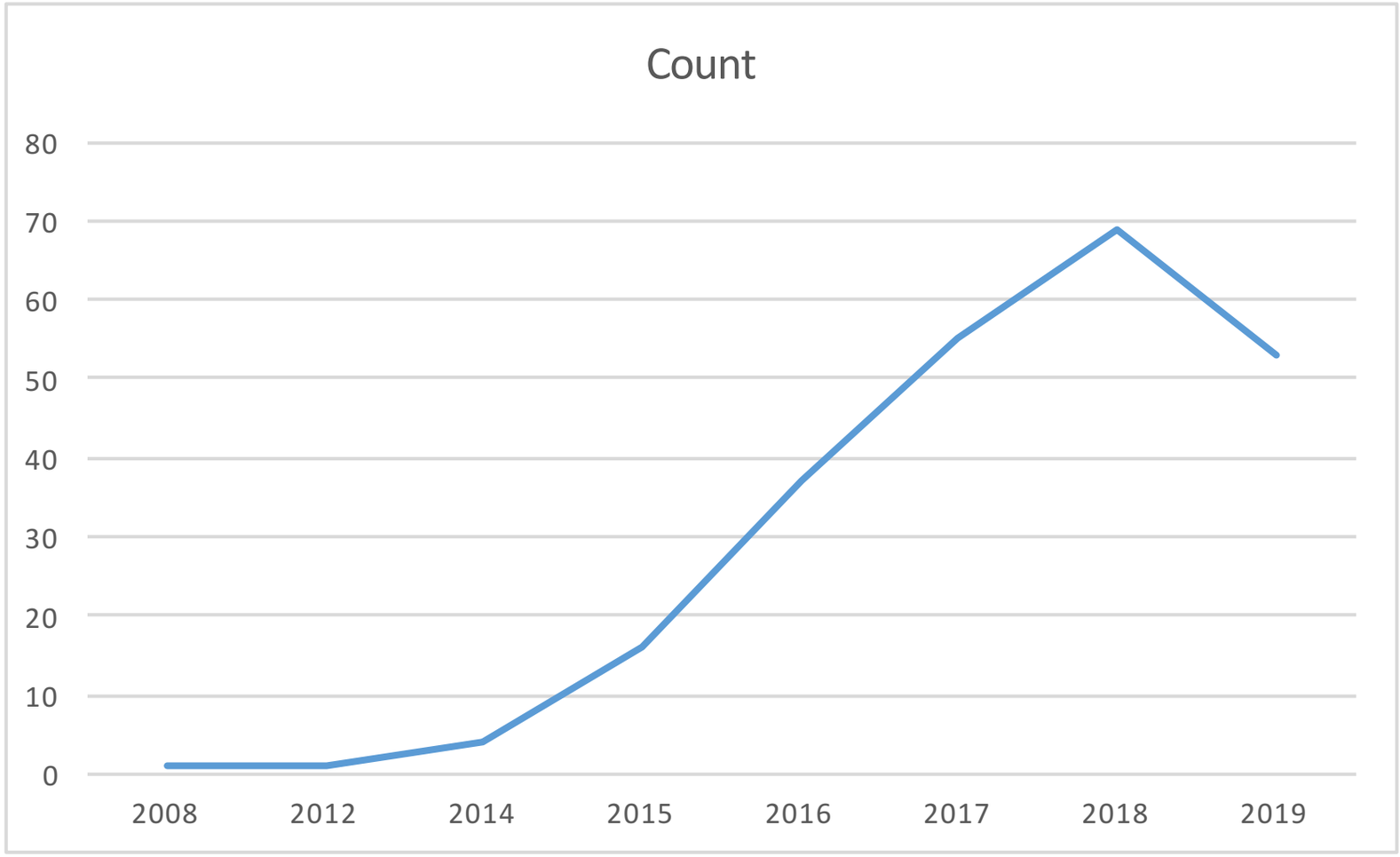
Implantes Customizados Para Ortopedia

Leandro Ejnisman

Implantes Customizados

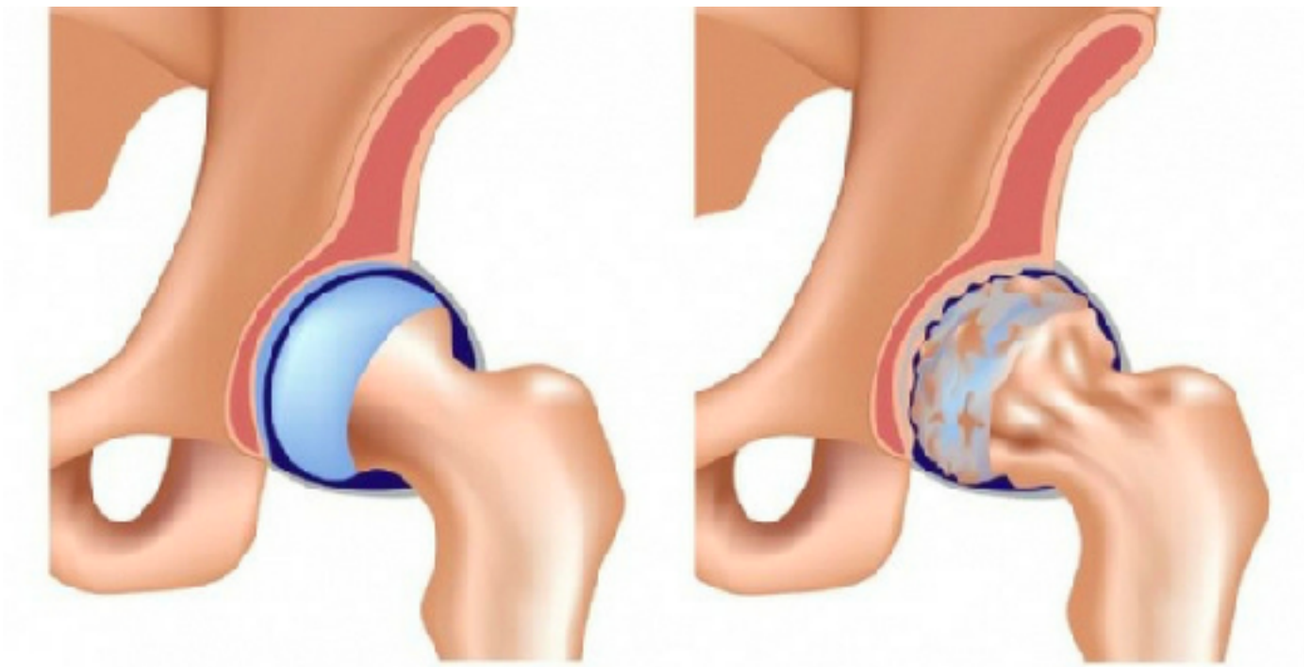
Artigos PubMed: “Orthopedics 3D Printing”

Year	Count
2008	1
2012	1
2014	4
2015	16
2016	37
2017	55
2018	69
2019	53

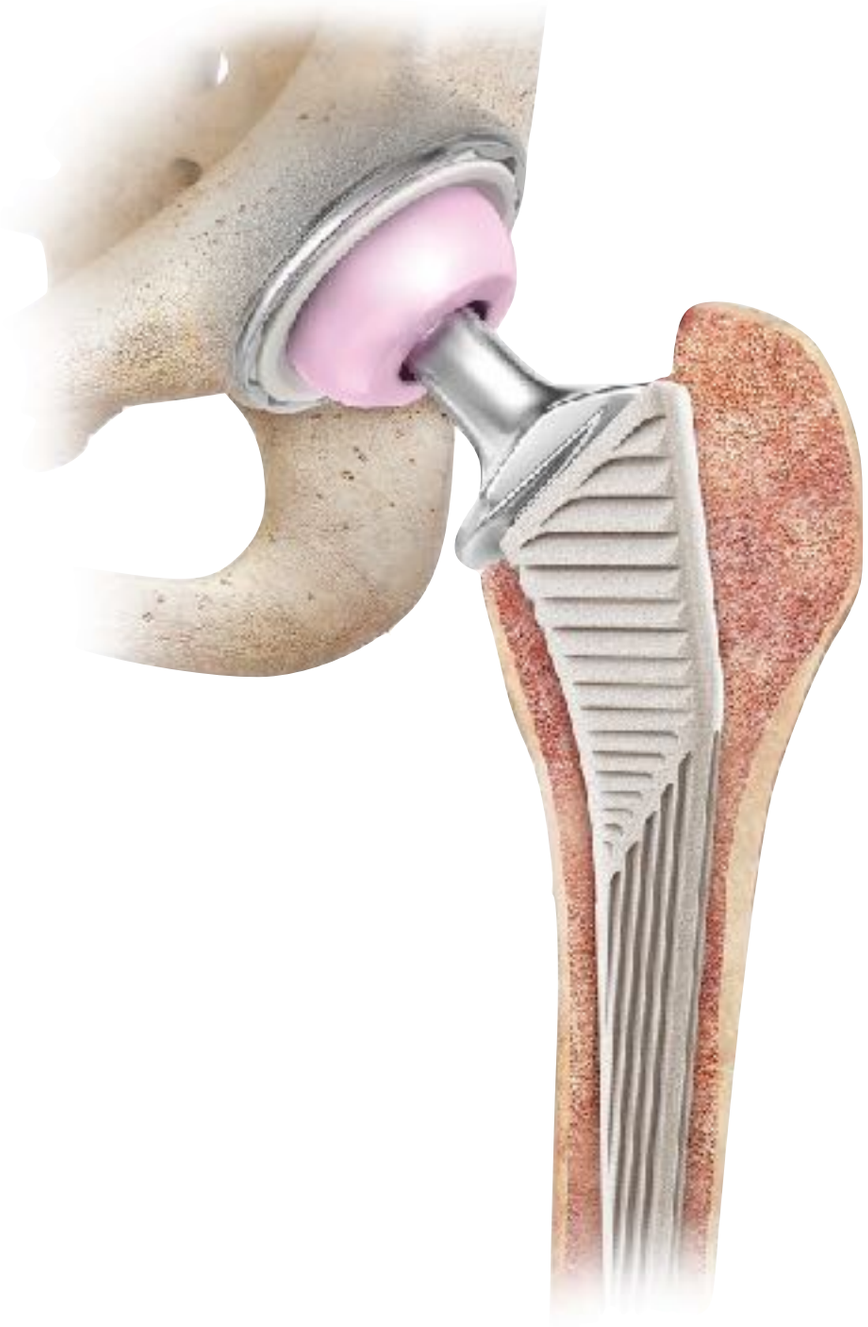


Implantes Ortopédicos

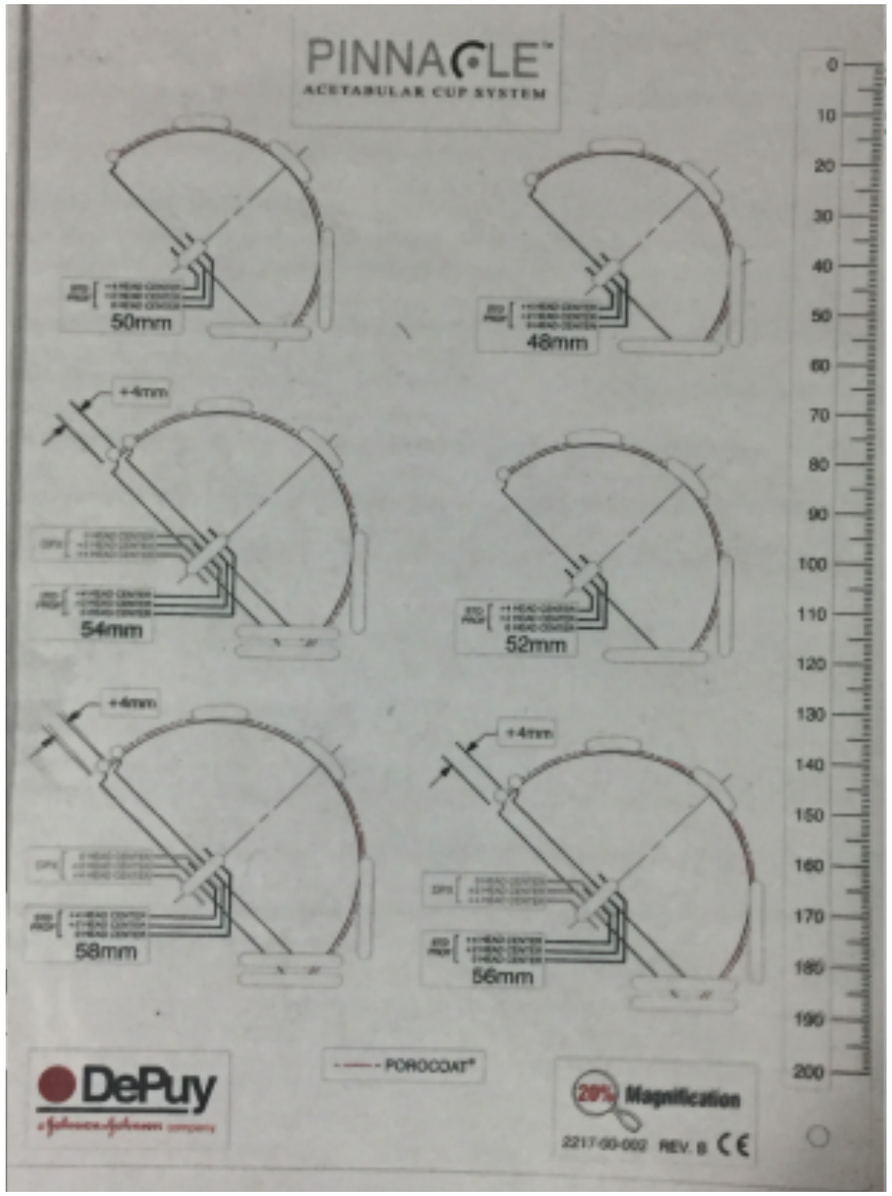
Prótese total do quadril

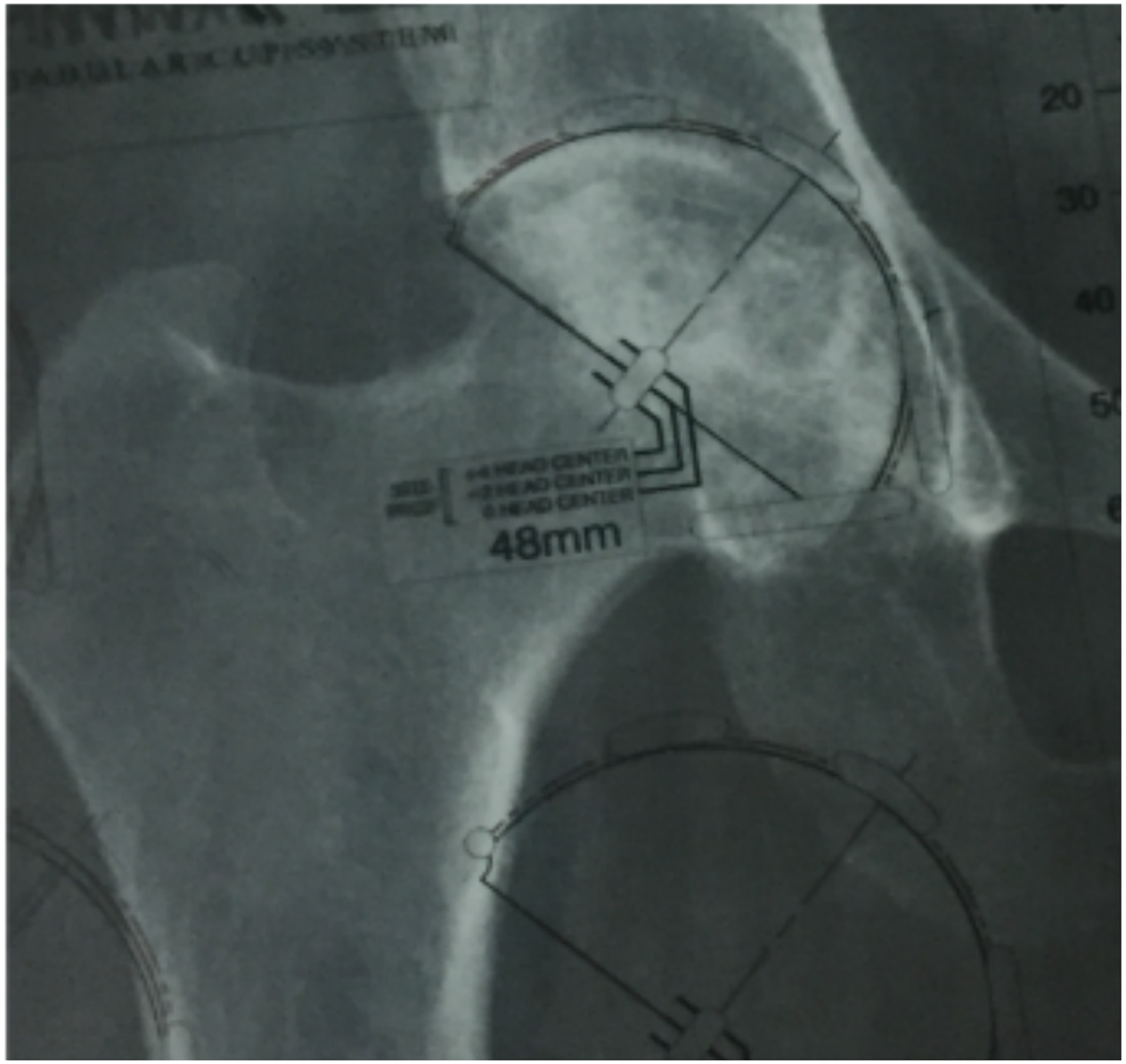


Normal **Artrose**



Planejamento





Cirurgia

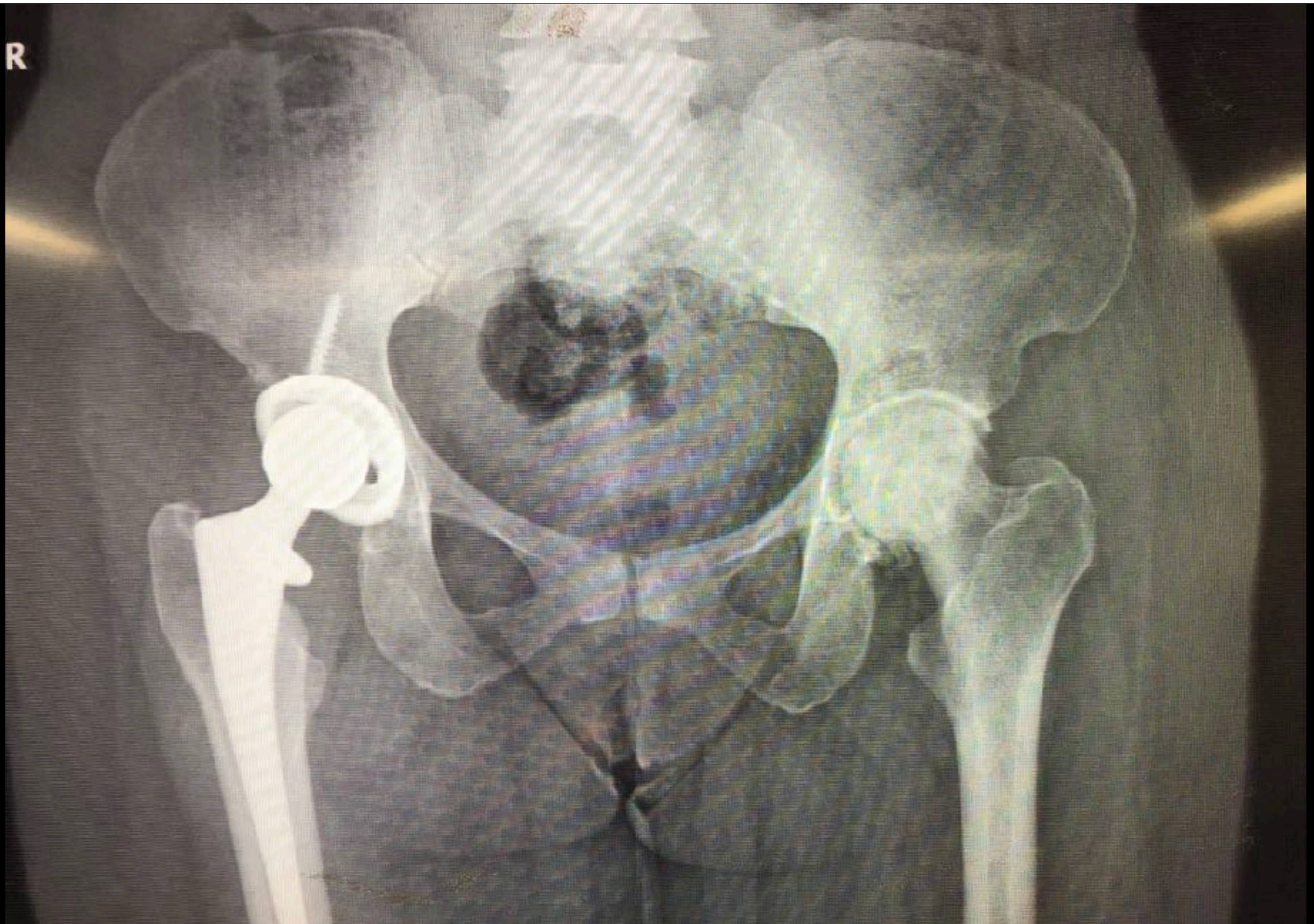
O Problema

Manute Bol
2.31 m

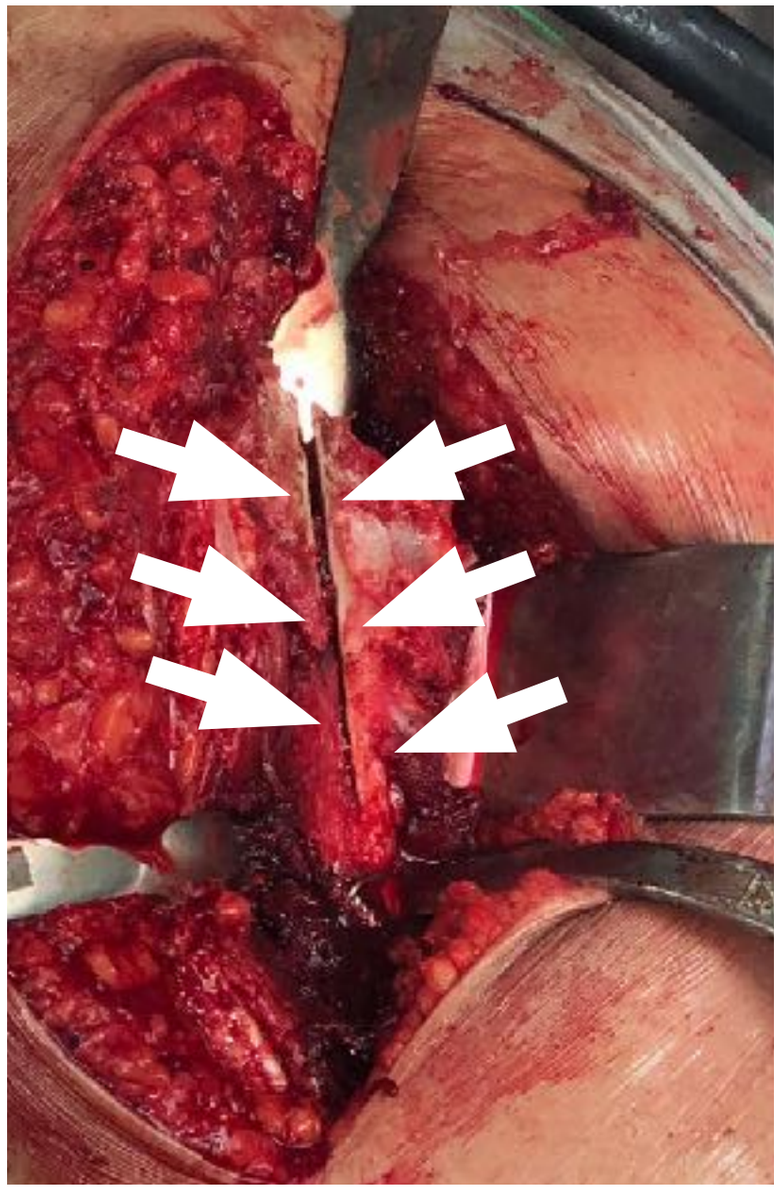
Muggsy Bogues
1.60 m

Segundo Problema: Deformidades

Segundo Problema: Deformidades



Segundo Problema: Deformidades

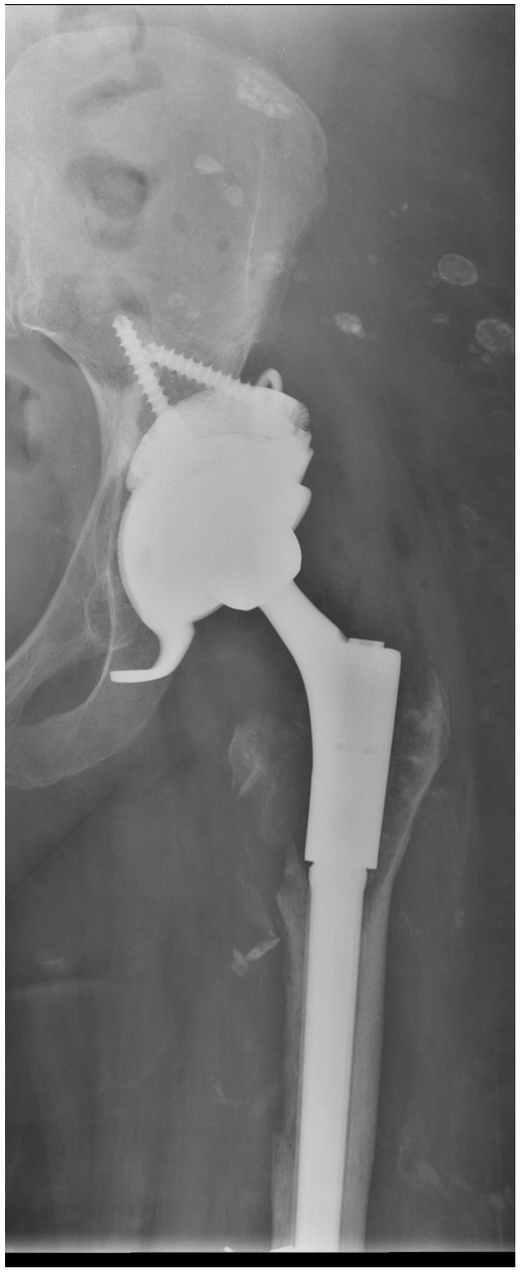


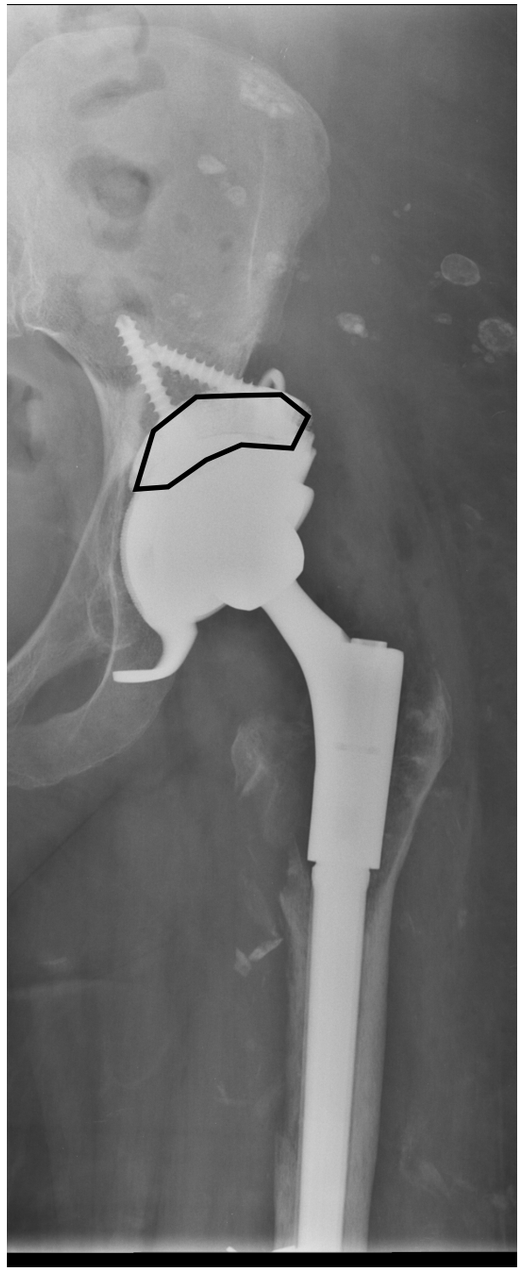
Terceiro Problema: Perdas Ósseas

Perda Óssea

EVOLUÇÃO

Solução

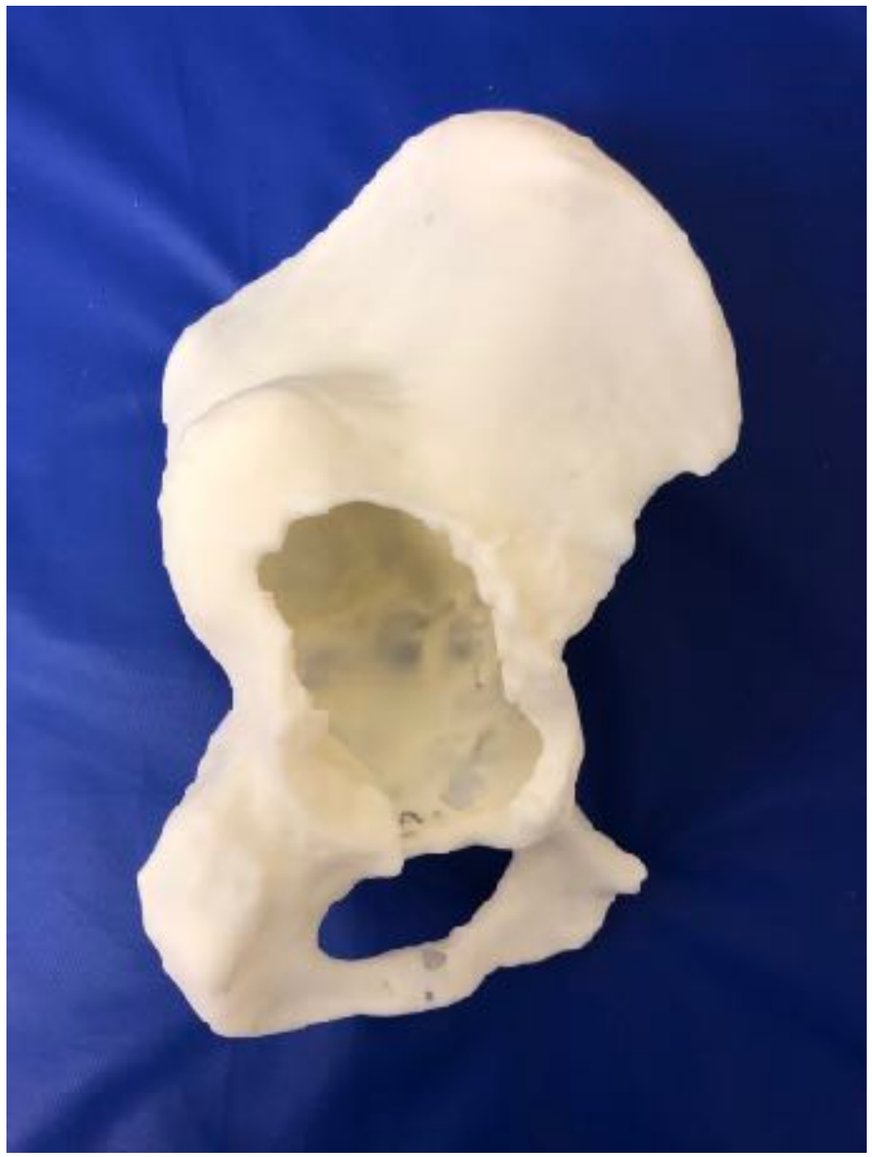


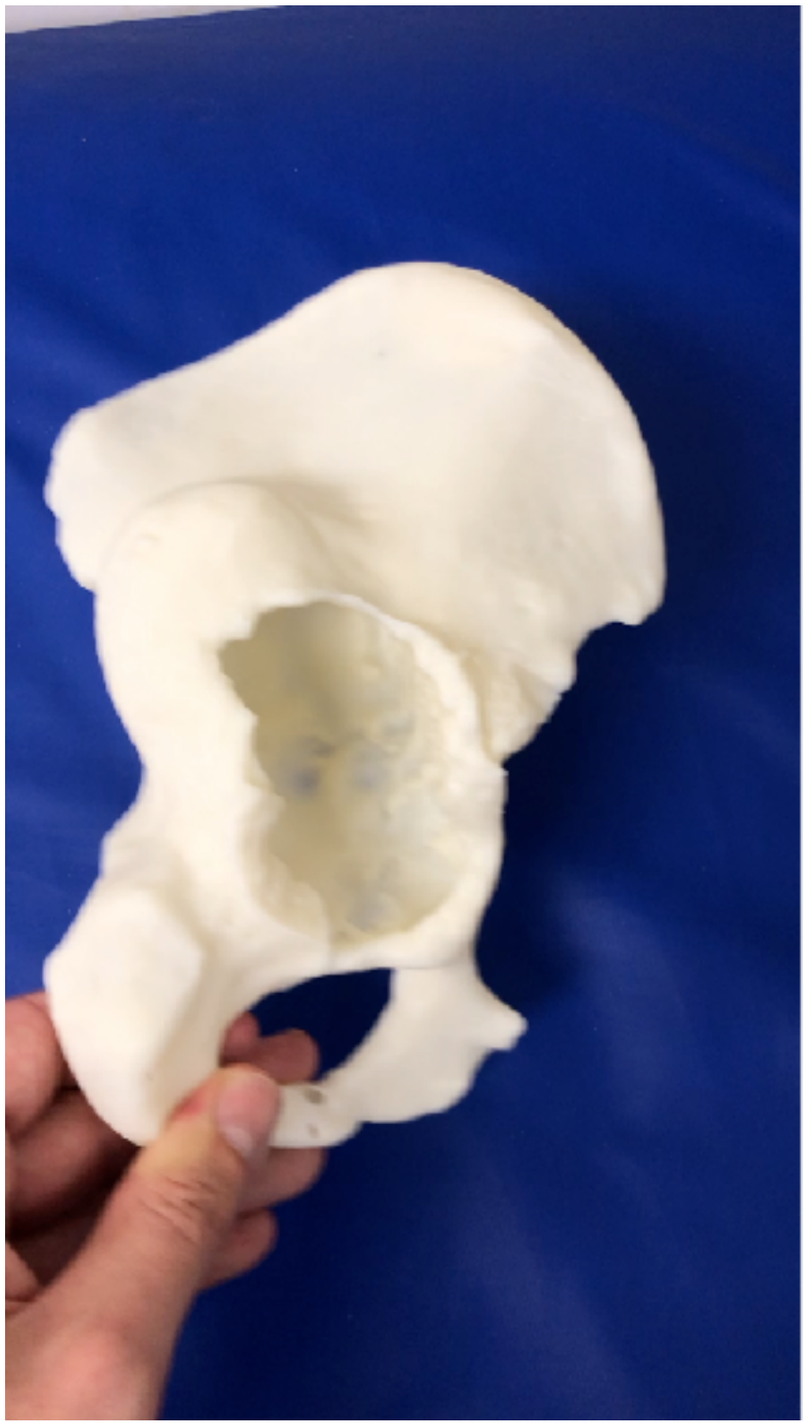


Planejamento com Impressão 3D

Caso cedido pelo Dr Matheus Zanchetta

Implante customizado





Problemas “Brasil"

ANEXO I – TERMO DE RESPONSABILIDADE / ESCLARECIMENTO PARA A UTILIZAÇÃO EXCEPCIONAL DE IMPLANTE SOB MEDIDA

Agência Nacional de Vigilância Sanitária

TERMO DE RESPONSABILIDADE / ESCLARECIMENTO PARA A UTILIZAÇÃO EXCEPCIONAL DE IMPLANTE SOB MEDIDA

A ser preenchido pelo (a) médico (a):

Eu, Dr.(a)_____, registrado no Conselho Regional de Medicina do Estado _____ sob o número_____ telefone_____ e-mail _____ sou o responsável pelo tratamento e acompanhamento do (a) paciente _____ de sexo _____ com idade de_____ anos completos, com diagnóstico de_____. CID:___, para quem estou indicando o IMPLANTE SOB MEDIDA_____ FABRICADO PELA EMPRESA [redacted] por entender que esta é uma melhor opção terapêutica em relação ao uso de produtos regularizados na ANVISA.

1. Informei ao paciente/responsável legal que este produto não possui registro no Brasil, portanto não possui a sua segurança e eficácia avaliada pela Anvisa, podendo causar reações adversas inesperadas ao paciente.

Assinatura e carimbo do (a) médico (a): _____ C.R.M.:_____
Data: ____/____/____

A ser preenchido pelo paciente ou responsável legal:

Eu [redacted], paciente / responsável legal pelo paciente acima citado, carteira de identidade nº [redacted] órgão expedidor SSP residente à [redacted] bairro Jardim Alvorada cidade João Cavalcanti, estado MG telefone [redacted] e-mail [redacted] recebi pessoalmente as informações do(a) prescritor(a) sobre o tratamento e:

☒ **declaro que entendi as orientações prestadas e estou de acordo com a proposta de tratamento.**

Assinatura: [redacted]
Data: 26/06/2019

Problemas “Brasil"

ANEXO II – TERMO DE RESPONSABILIDADE / ESCLARECIMENTO PARA A UTILIZAÇÃO EXCEPCIONAL DE IMPLANTE SOB MEDIDA

Agência Nacional de Vigilância Sanitária

TERMO DE RE
EXCEPCIONAL D

A ser preenchido

Eu, Dr.(a)
Medicina do Esta
paciente _____ do sexo _____ com idade de_____ anos completos, com diagnóstico de_____, CID:___, para quem estou indicando o IMPLANTE SOB MEDIDA_____ FABRICADO PELA EMPRESA [redacted] por entender que esta é uma melhor opção terapêutica em relação ao uso de produtos regularizados na ANVISA.

1.	Informei ao paciente/responsável legal que este produto não possui registro no Brasil, portanto não possui a sua segurança e eficácia avaliada pela Anvisa, podendo causar reações adversas inesperadas ao paciente.

Assinatura e carimbo do (a) médico (a): _____ C.R.M.:_____
Data: _____/_____/_____

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Eu [redacted], paciente / responsável legal pelo paciente acima citado, carteira de identidade nº [redacted] órgão expedidor SSP residente à [redacted] bairro Jardim Esperança cidade Três Corações estado MG telefone [redacted] e-mail [redacted] recebi pessoalmente as informações do(a) prescritor(a) sobre o tratamento e:

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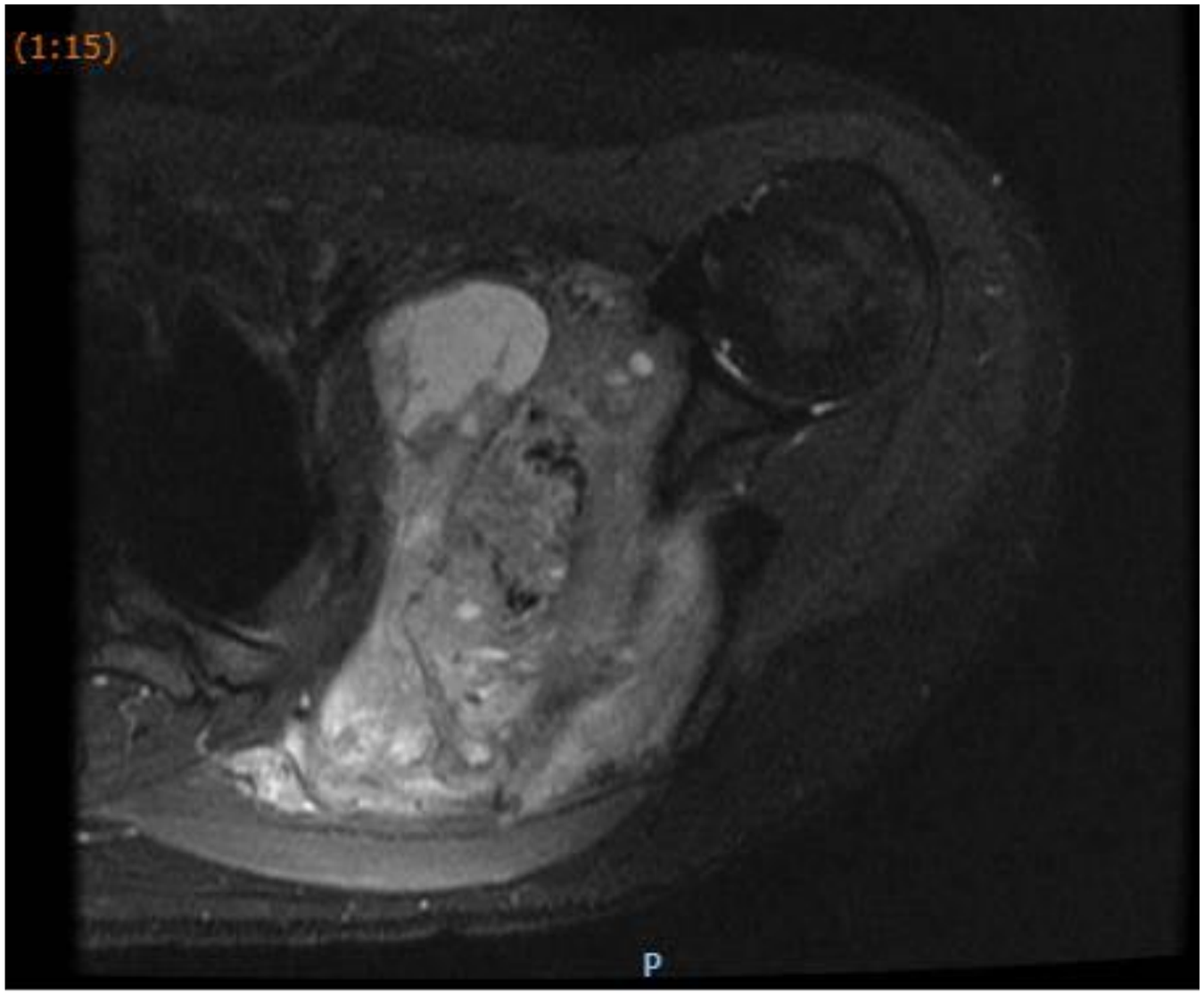
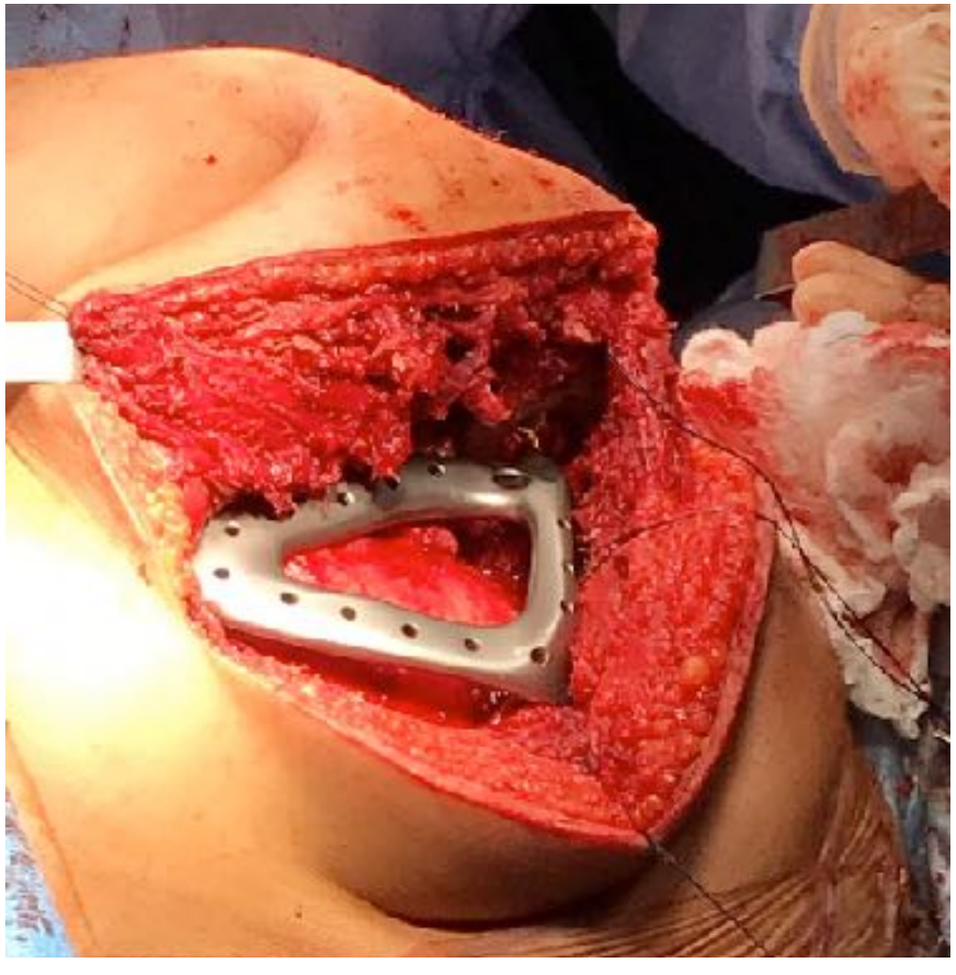
1. Informei ao paciente/responsável legal que este produto não possui registro no Brasil, portanto não possui a sua segurança e eficácia avaliada pela Anvisa, podendo causar reações adversas inesperadas ao paciente.

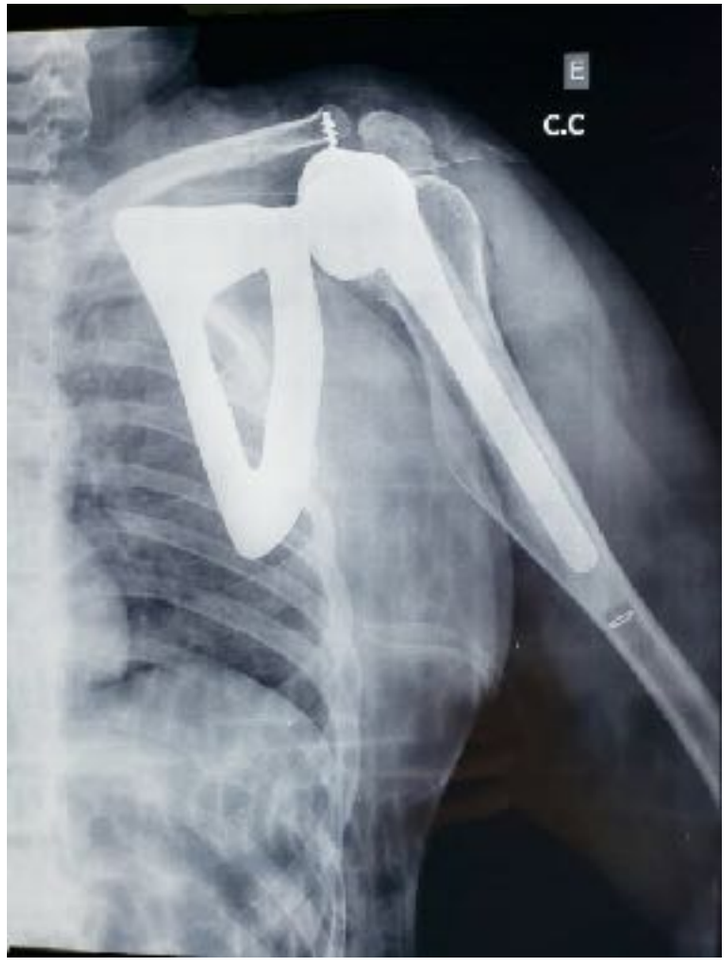
Implante customizado

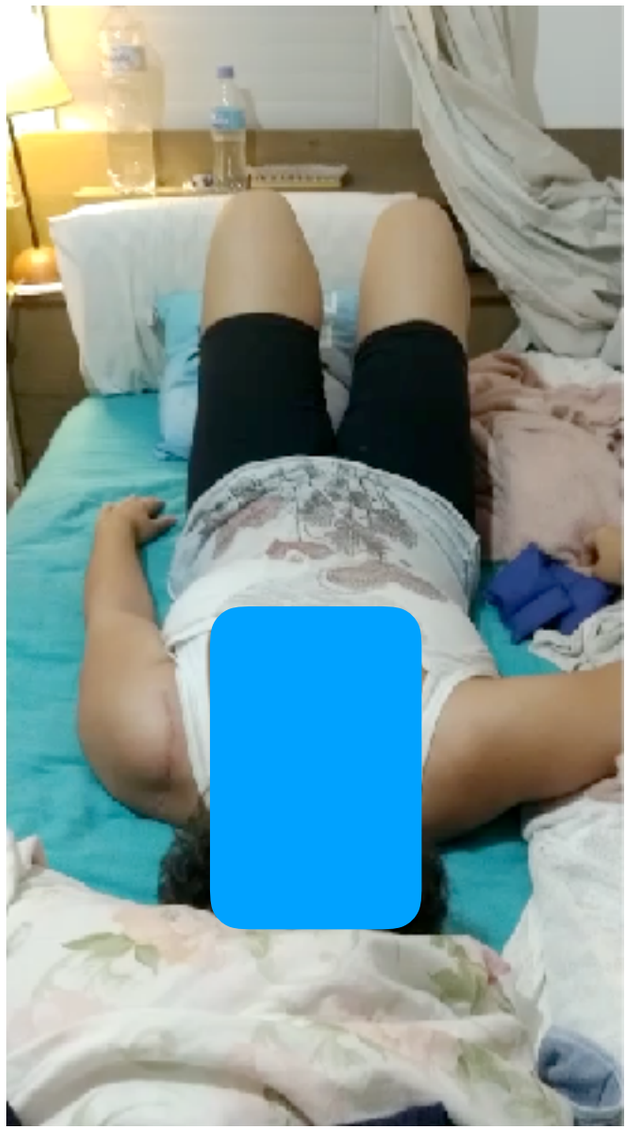
Osteossarcoma de escápula



Caso cedido por Dr Andre Mathias e Dr Andre Ferrari
Grupo de Tumor IOT-HCFMUSP
Operado na Beneficência Portuguesa




E
C.C



Implante customizado

Tálus

Caso cedido por Dr Rafael Ortiz
Grupo de Pé IOT-HCFMUSP


5

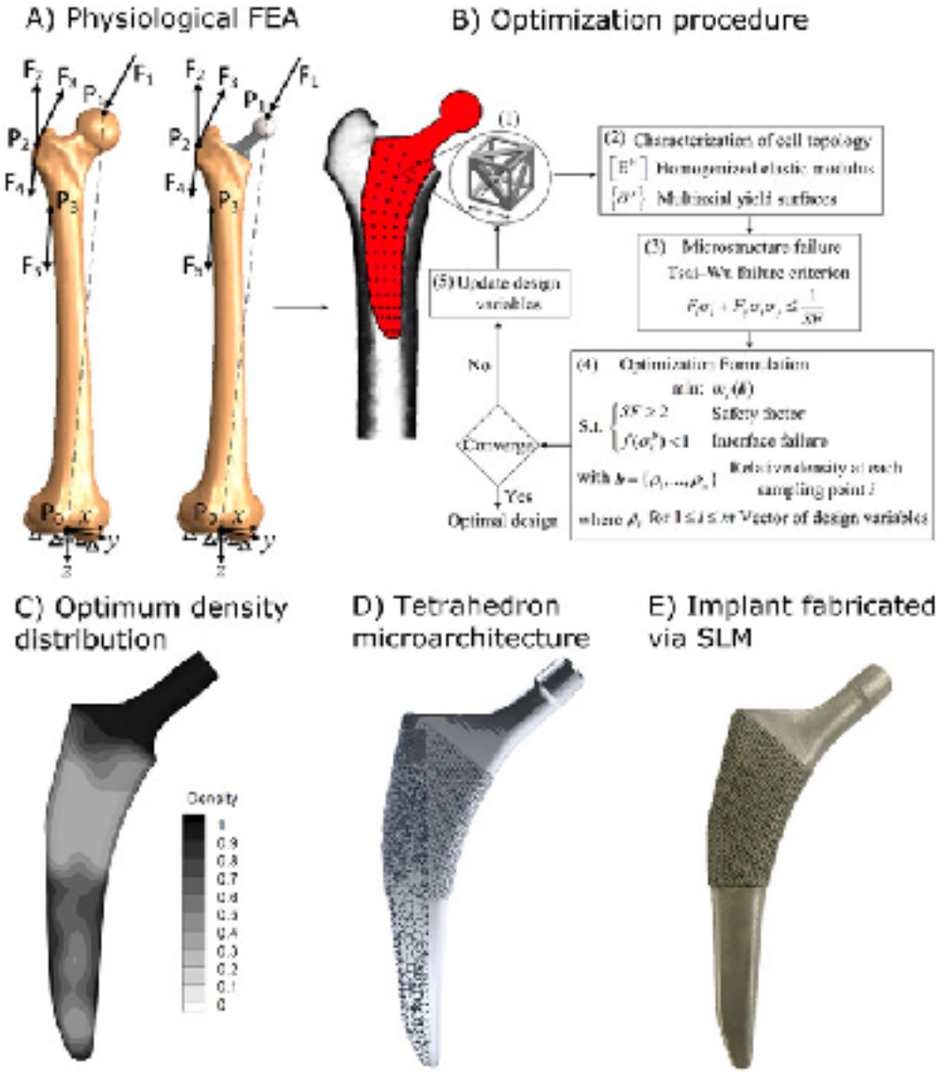
Literatura

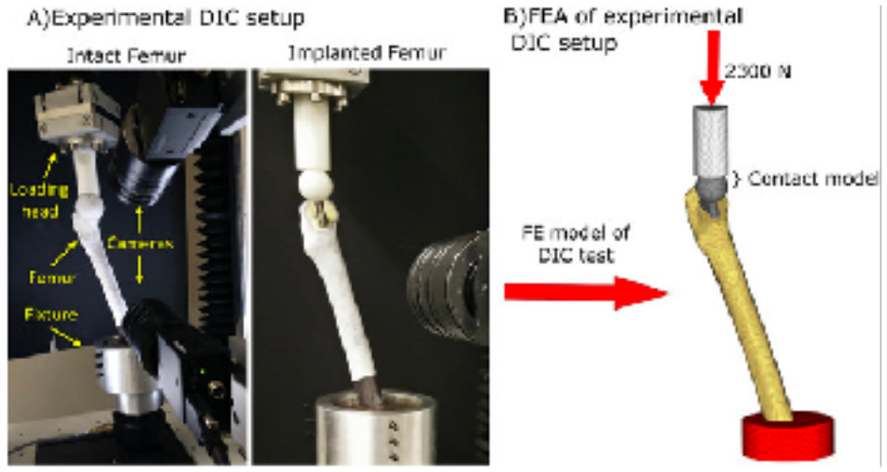
Fully porous 3D printed titanium femoral stem to reduce stress-shielding following total hip arthroplasty

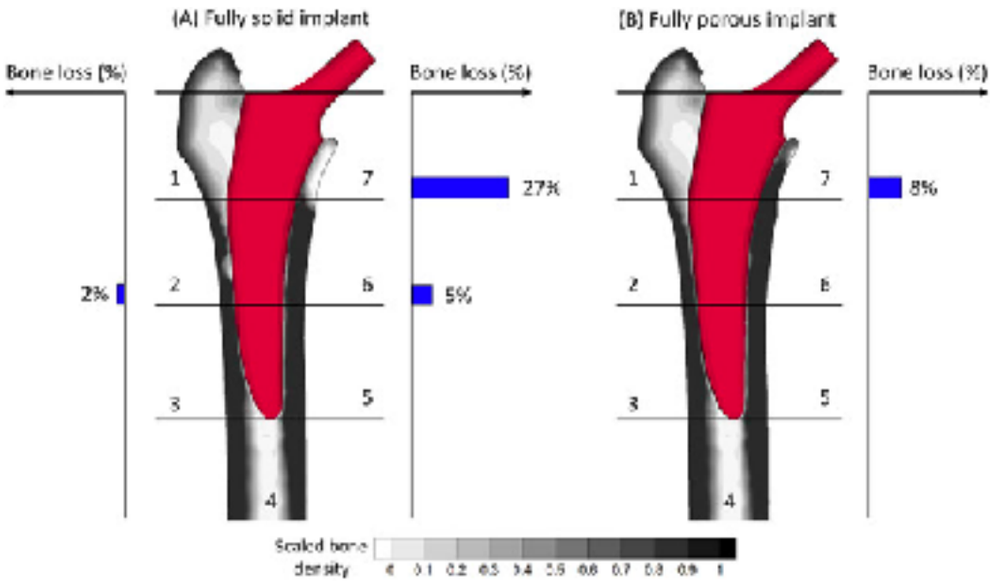
Sajad Arabnejad, Burnett Johnston, Michael Tanzer, Damiano Pasini

Journal of Orthopaedic Research
ORS Orthopaedic Research Society

Trabalho experimental
Redução de 75% no "stress shielding"







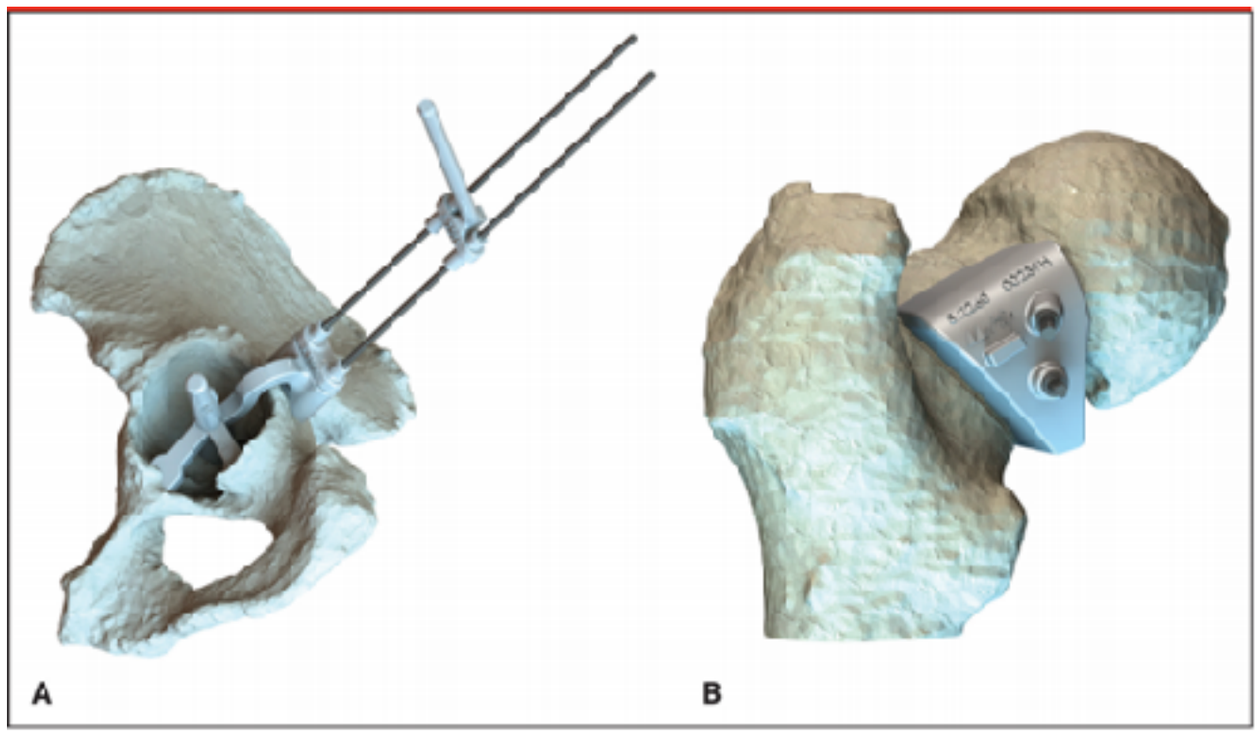
Review Article

3D-printed Patient-specific Guides for Hip Arthroplasty

Johann Henckel, MD
Thomas J. Holme, MD
Warwick Radford, MD
John A. Skinner, MD
Alister J. Hart, MD

Journal of the American Academy of Orthopaedic Surgeons

August 15, 2018, Vol 26, No 16



Images showing the MyHip system (Medacta). **A,** The acetabular guide is seated into the acetabulum, and two pins are inserted through attached drill sleeves. The guide is removed, leaving the two pins to act as either a constrained or unconstrained guide to reaming and component placement. **B**, The femoral guide has a contoured fit to the femoral neck/head and is kept in place for the neck cut by two intracsseous pins. (Courtesy of Medacta, Chicago, IL.)

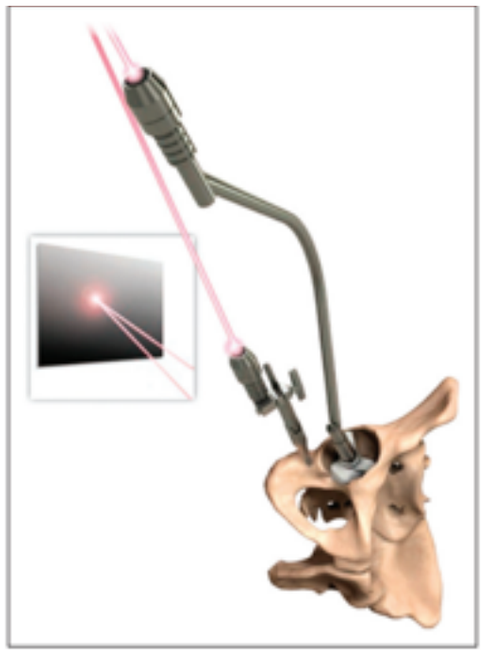


Image showing the OPS system (Corin Group). A guide and acetabular model are created for each patient. The soft tissue in the acetabular fossa is excised, and the guide is inserted and compared with the 3D printed model to confirm accurate seating in the acetabulum. A laser handle is attached to the guide to focus a laser onto the operating room wall. A second, pelvic-mounted laser is then directed to match this point on the wall. Use of this second laser allows for maintenance of the laser point while reaming the acetabulum. The implant introducer has a laser attachment, which has to line up with the pelvic-fixed laser on the wall to ascertain the correct inclination and anteversion of the implant. The 3D printed model can also be used to demonstrate the expected overhang of native bone as a second check of correct implant placement. (Courtesy of Corin Group, Pymble, NSW, Australia.)

Image showing the Signature Hip system (Zimmer Biomet). The 3D printed Primary Acetabular Guide is seated into the acetabulum, and pins are placed into the rim of the acetabulum through attached drill sleeves. The pins are left in place, and the guide is removed. These pins can act as either a constrained or nonconstrained guide to reaming of the acetabulum and placement of the implant. (Courtesy of Zimmer Biomet, Warsaw, IN.)

Custom Acetabular Cages Offer Stable Fixation and Improved Hip Scores for Revision THA With Severe Bone Defects

Huiwu Li, MD, Xinhua Qu, MD, Yuanqing Mao, MD, Kerong Dai, MD, and Zhenan Zhu, MD

Clinical Orthopaedics and Related Research®
PUBLISHED SINCE 1953

Clin Orthop Relat Res. 2016 Mar; 474(3): 731–740.

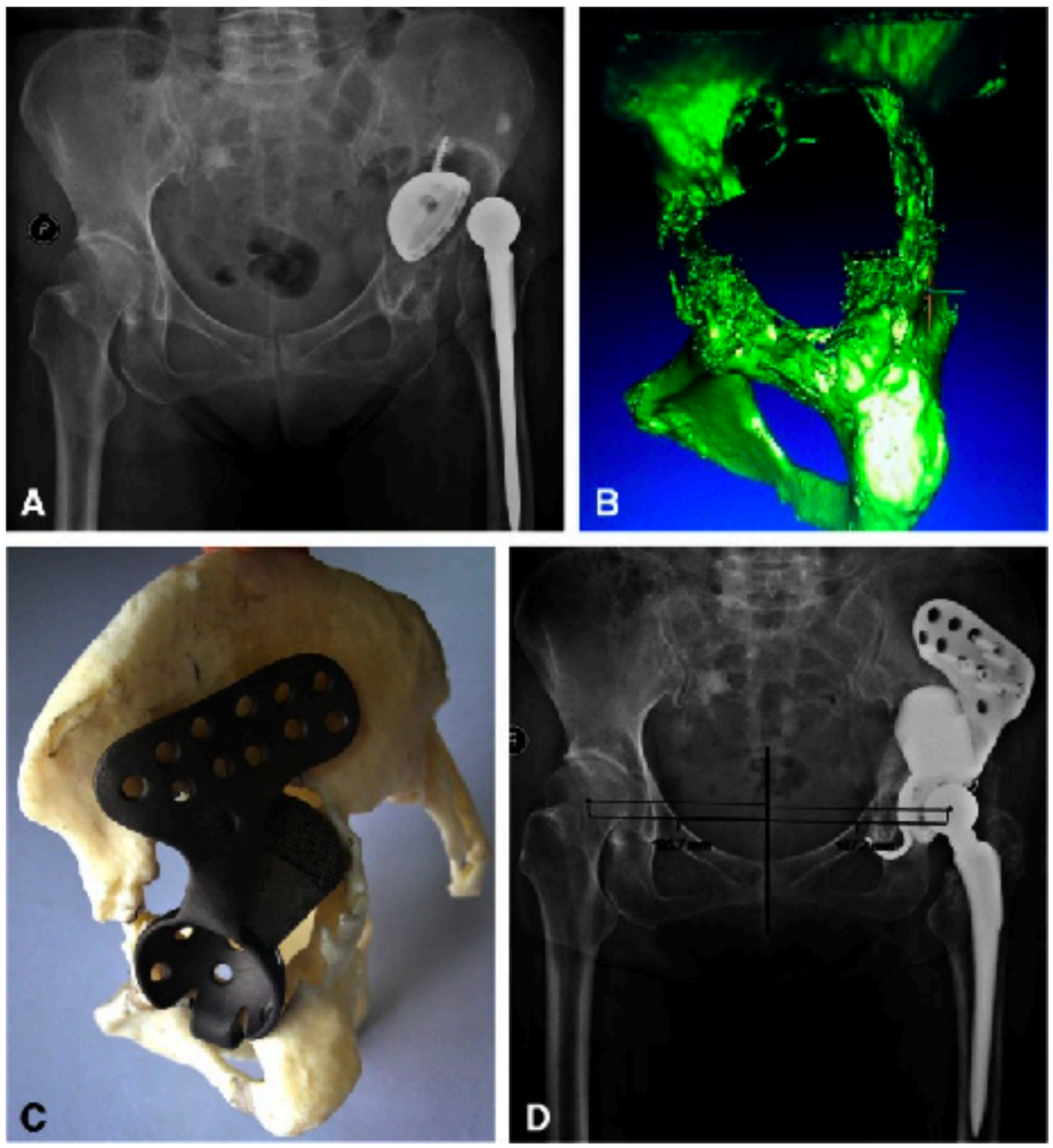
24 pacientes

Componente acetabular de revisão customizado 3D

Seguimento 67 meses (24-120)

Escore 36 -> 82

1 soltura



Research Paper

Novel 3D-printed prosthetic composite for reconstruction of massive bone defects in lower extremities after malignant tumor resection☆

Lu Yajie[a], Chen Guojing[a], Long Zuoyao[a], Li Minghui[a], Ji Chuanlei[a], Wang Fengwei[b], Li Huanzhang[a], Lu Jianxi[c], Wang Zhen[a,*], Li Jing[a,*]

[a] Department of Orthopedics, Xijing Hospital, The Air Force Medical University, No. 127 Changle West Road, Xi'an, Shaanxi 710032, PR China
[b] Department of Orthopedics, Shaanxi Zheng He Hospital, Xi'ar, Shaanxi 710043, PR China
[c] Shanghai Bio-lu Biomaterials Co., Ltd., Shanghai 201100, PR China

Journal of Bone Oncology 16 (2019) 100220

Composite: prótese customizada, β-tricálcio fosfato biocerâmica, e/ou fíbula vascularizada

10 casos

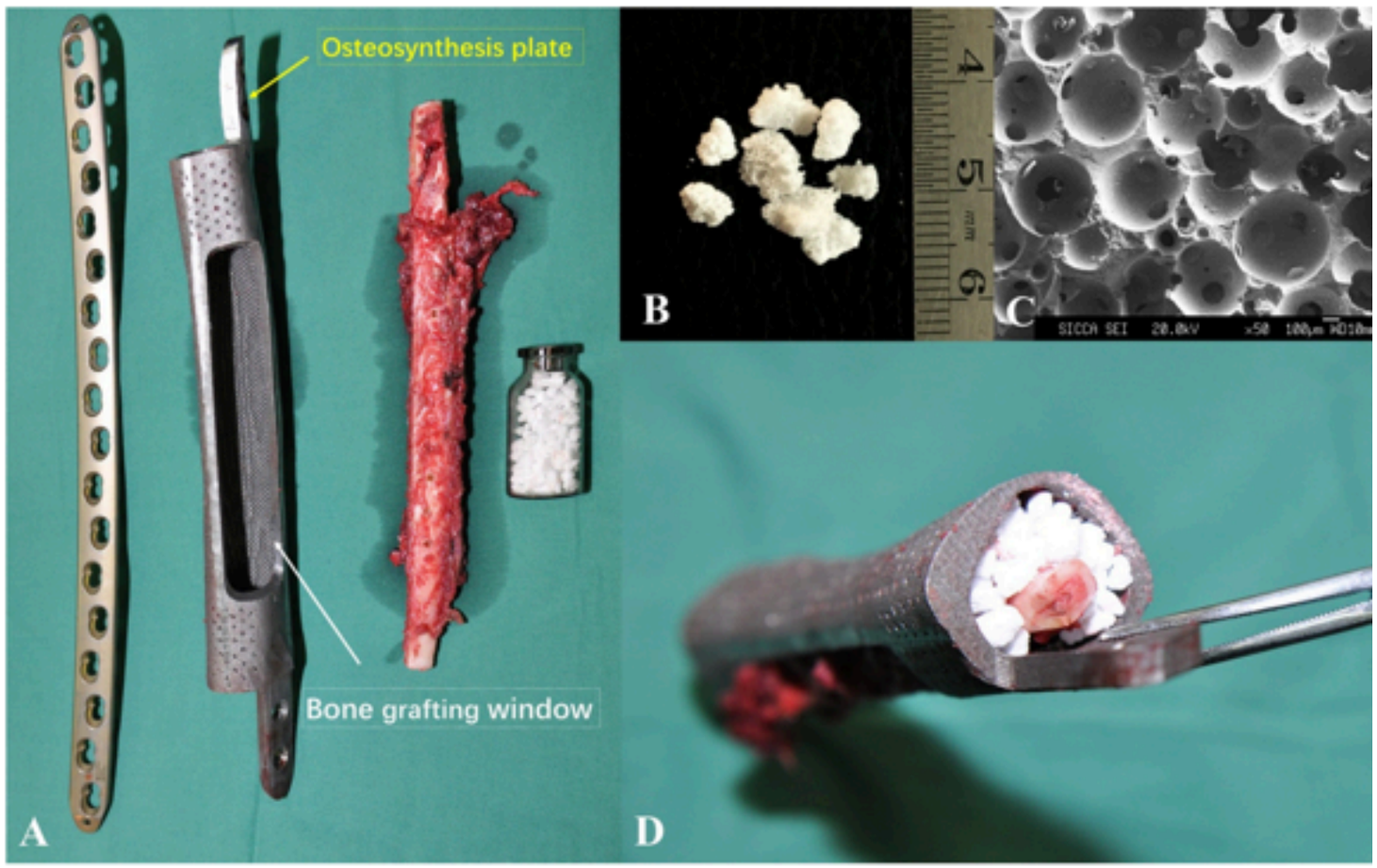
Femur 5 / Tibia 5

Seguimento 16.9 meses

Todos vivos

Escore MSTS 80.3 ± 11.05%

RX/TC/SPECT integração +



Research Paper

Novel 3D-printed prosthetic composite for reconstruction of massive bone defects in lower extremities after malignant tumor resection☆

Lu Yajie[a], Chen Guojing[a], Long Zuoyao[a], Li Minghui[a], Ji Chuanlei[a], Wang Fengwei[b], Li Huanzhang[a], Lu Jianxi[c], Wang Zhen[a,*], Li Jing[a,*]

[a] Department of Orthopedics, Xijing Hospital, The Air Force Medical University, No. 127 Changle West Road, Xi'an, Shaanxi 710032, PR China
[b] Department of Orthopedics, Shaanxi Zheng He Hospital, Xi'ar, Shaanxi 710043, PR China
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Journal of Bone Oncology 16 (2019) 100220

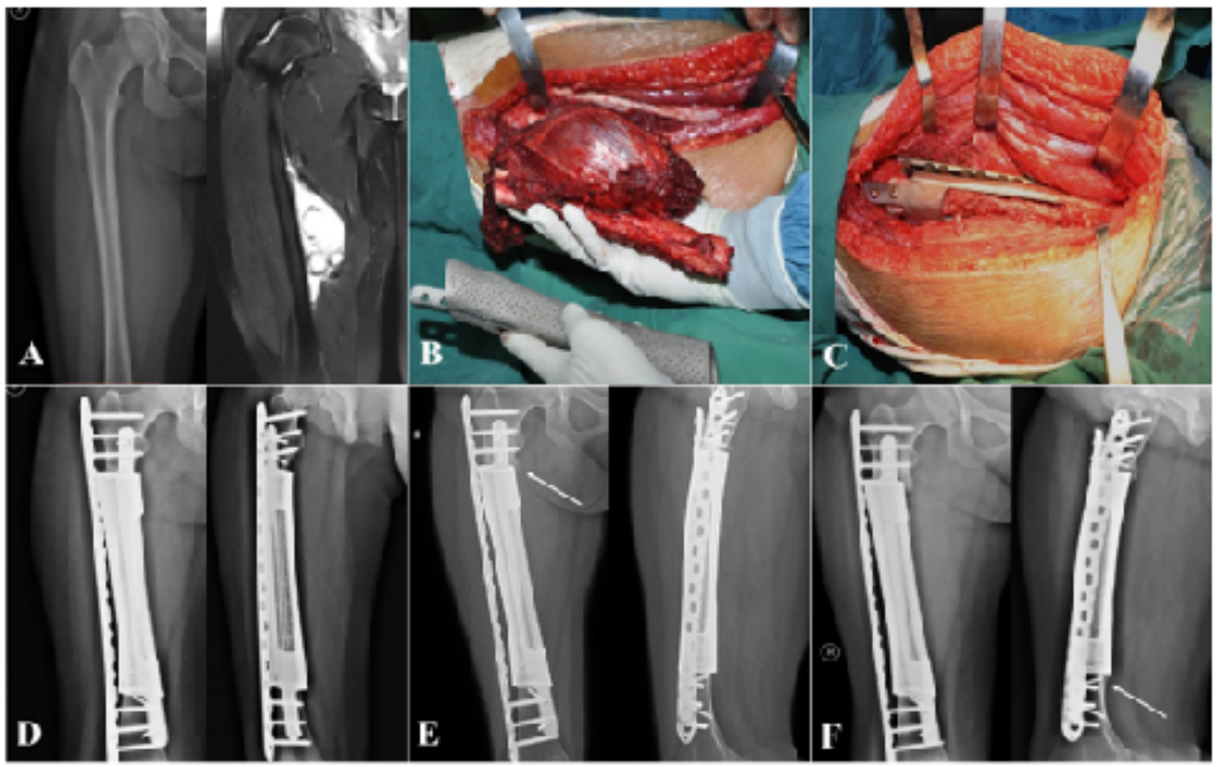

Fig. 1. The implants used in surgery.
A: The implanting system included 3D-printed prosthesis, vascularized fibula, bioceramic granules, and plates.
B: β-TCP bioceramics granules (irregular, with a diameter of 1.5–3.5 mm).
C: Microstructure of the β-TCP bioceramics granules (the pore with a diameter of 500–600 μm and the interconnection with a diameter of 120 μm).
D: Composite (consisted of 3D-printed prosthesis, β-TCP bioceramics granules and vascularized fibula).

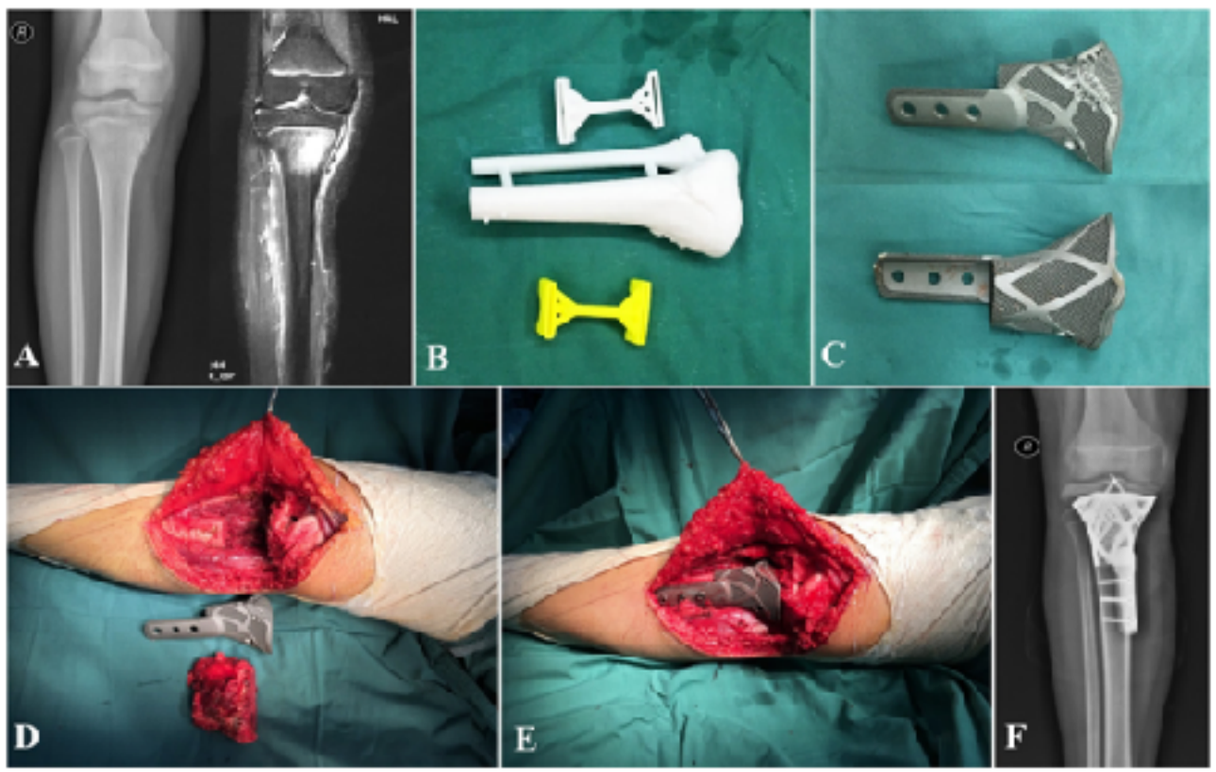

Fig. 3. Case, female, 16 years old, pathological diagnosis of Ewing's sarcoma of the right femur, underwent P-P-B reconstruction.
A: Preoperative X-ray and MRI, showing a huge tumor with a length of 15.13 cm.
B: Tumor resection, the 3D-printed prosthesis perfectly matched the anatomical characteristics of the bone defect.
C: Installation and fixation of the bioactive prosthesis composite.
D: X-ray: one month after operation.
E: X-ray: 12 months after operation, the prosthesis was in situ without loosening. The arrow showed osseous coverage between prosthesis and residual bone.
F: X-ray: 24 months after operation, a solid integument was formed between bone and prosthesis. The arrow indicated a 'spot welding', which connecting edge of the prosthesis to bone.

Para levar para casa

Implantes customizados são uma realidade na ortopedia

Dificuldades burocráticas no Brasil

Guias cirúrgicos e modelos para planejamento são mais simples de serem utilizados

Resultados ainda iniciais mas animadores

SAVE THE DATE

USP-MIT
HACKMED
Conference & Health Hackathon

São Paulo, 31 de janeiro a 02 de fevereiro de 2020.

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